

Claims

1. A modified water-soluble glucose dehydrogenase having pyrroloquinoline quinone as a coenzyme, wherein one or more amino acid residues of a wild type water-soluble glucose dehydrogenase are replaced with other amino acid residues and having high selectivity for glucose compared with the wild type water-soluble glucose dehydrogenase.
2. A modified glucose dehydrogenase having pyrroloquinoline quinone as a coenzyme, wherein one or more amino acid residues in a region of 186-206 amino acid of water-soluble PQQGDH derived from *Acinetobacter calcoaceticus* or in an equivalent region from other species are replaced with other amino acid residues.
3. A modified glucose dehydrogenase having pyrroloquinoline quinone as a coenzyme wherein Gln192 of water-soluble PQQGDH derived from *Acinetobacter calcoaceticus* or an amino acid residue in an equivalent position from other species are replaced with another amino acid residues.
4. A modified glucose dehydrogenase having pyrroloquinoline quinone as a coenzyme wherein Gln192 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with another amino acid residue.
5. The modified glucose dehydrogenase as claimed in claim 4 wherein Gln192 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with alanine, glycine, glutamic acid, leucine, phenylalanine, serine or aspartic acid.

6. A modified glucose dehydrogenase having pyrroloquinoline quinone as a coenzyme wherein both Gln192 and Asp167 of the amino acid sequence defined in SEQ ID NO: 1 are replaced with other amino acid residues.
7. The modified glucose dehydrogenase as claimed in claim 6 wherein Asp167 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with another amino acid residue, and Gln192 is replaced with alanine, glycine, glutamic acid, leucine, phenylalanine, serine or aspartic acid.
8. The modified glucose dehydrogenase as claimed in claim 6 wherein Asp167 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with glutamic acid, and Gln192 is replaced with alanine, glycine, glutamic acid, leucine, phenylalanine, serine or aspartic acid.
9. A modified glucose dehydrogenase having pyrroloquinoline quinone as a coenzyme wherein Asp167 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with another amino acid residue, and Asn452 is replaced with another amino acid residue.
10. The modified glucose dehydrogenase as claimed in claim 9 wherein Asp167 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with glutamic acid, and Asn452 is replaced with another amino acid residue.
11. The modified glucose dehydrogenase as claimed in claim 9 wherein Asp167 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with glutamic acid, and Asn452 is replaced with threonine.

12. A modified glucose dehydrogenase having pyrroloquinoline quinone as a coenzyme wherein Gln192 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with another amino acid residue, and Asn452 is replaced with another amino acid residue.

13. The modified glucose dehydrogenase as claimed in claim 12 wherein Gln192 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with alanine, glycine, glutamic acid, leucine, phenylalanine, serine or aspartic acid, and Asn452 is replaced with another amino acid residue.

14. The modified glucose dehydrogenase as claimed in claim 12 wherein Gln192 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with alanine, glycine, glutamic acid, leucine, phenylalanine, serine or aspartic acid, and Asn452 is replaced with threonine.

15. A modified glucose dehydrogenase having pyrroloquinoline quinone as a coenzyme wherein Leu193 of water-soluble glucose dehydrogenase derived from *Acinetobacter calcoaceticus* or an amino acid residue in an equivalent position from other species is replaced with another amino acid residue.

16. A modified glucose dehydrogenase having pyrroloquinoline quinone as a coenzyme wherein Leu193 of the amino acid sequence defined in SEQ ID NO: 1 is replaced with another amino acid residue.

17. The modified glucose dehydrogenase as claimed in claim 16 wherein Leu193 of the amino acid sequence defined in SEQ

ID NO: 1 is replaced with alanine, glycine, methionine, tryptophan or lysine.

18. A modified glucose dehydrogenase having pyrroloquinoline quinone as a coenzyme comprising the amino acid sequence:

Gly-Arg-Asn-Xaa1-Xaa2-Ala-Tyr-Leu

wherein Xaa1 and Xaa2 are independently any amino acid residues, provided that when Xaa1 is Gln, then Xaa2 is not Leu.

19. The modified glucose dehydrogenase as claimed in claim 18, wherein Xaa1 is Ala, Gly, Glu, Leu, Phe, Ser or Asp, and Xaa2 is Ala or Gly.

20. A gene encoding a modified glucose dehydrogenase as claimed in any one of claims 1 to 19.

21. A vector comprising the gene as claimed in claim 20.

22. A transformant comprising the gene as claimed in claim 20.

23. The transformant as claimed in claim 22 wherein the gene as claimed in claim 20 is integrated in its chromosome.

24. A glucose assay kit comprising the modified glucose dehydrogenase as claimed in any one of claims 1-19.

25. A glucose sensor comprising the modified glucose dehydrogenase as claimed in any one of claims 1-19.